

A REVIEW OF THE FAMILY GRYLLOPLATTIDAE (INSECTA)

by

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Order *Grylloblattida* (=Notoptera) are primitive orthopteroid insects. The systematic position of the order *Grylloblattida* has been controversial discussion, but according to A. RASNITSYN (1976; 1980) it is clear what recent family *Grylloblattidae* throughout *Blattogryllidae* connect with carboniferous-yurassic *Protoblattodea* and *Paraplecoptera* and *Protoperlaria* complex. I studied the *Blattogryllus karatavicus* A.RASNITSYN, 1976 and found what on the bases of the structures of female ovipositor, the apex of the male abdomen (including the two asymmetrical coxopodites with the tip of each bearing a simple style), on the forms of body, head, cerci and legs it closely related to *Grylloblattidae*, but well distinguish oneself by the form of pronotum, by the presents of wings and the 3 ocelli and especially by the tip of the fifth segment of tarsi bearing a big arolium without a pair claws. Therefore *Grylloblattidae* is a living representatives of the mainly fossil order of insects and may be named "living fossil". Pronotum of the fossil forms have a broad marginal area. Posterior margin of pronotum of the genus *Grylloblatta* and *Grylloblattina* have two poorly sclerotized zones on the lateral sides of the short middle projection which may be only a rest of marginal area (figs. 1, 17). On the bases of present of marginal area both this genera well distinguished from other *Grylloblattidae* and the form of pronotum seems to be an important taxonomic value. Genus *Grylloblattina* is the more primitive among the living *Grylloblattids* because of it have marginal area on pronotum symmetrical supra-anal plate of male, well developed pulvilli on tarsal segment and more numerous segments of the cerci. The genus *Grylloblatta* is also primitive, but the asymmetrical supra-anal plate of male is specialized, and weakly developed pulvilli and less numerous segments of cerci (both of them characterize immature specimens) demonstrated the process of juvenilization of imago in this genus. Both *Galloisiana* and *Grylloblattella* gen. n. are more progressive by lack of marginal area on the pronotum and by other structures of body.

In 1987 I travelled Petrov island in the Sokolovskaya Bay (Maritime Pro-

vince of USSR) the type locality of the *Grylloblattina djakonovi* BEI-BIENKO, 1951. This small island is covered by trees and take place in 300-400m from the mainland. The three immature specimens of *G. djakonovi* were taken in mixed coniferous-broad-leaved forest with predominance of *Taxus cuspidata* under stones covered by damp moss and in wet rotting foliage near small pools in 10-15 m from seaside. All three specimens have 7-segmented cerci with unspecialized segment. This specimen is much like immature ones of *Galloisiana kurentzovi* with 7-segmented cerci, but differs by only 3-4 long setal hairs or macrotrichiae on the lateral margin of cervical sclerite. Four macrotrichiae on cervical sclerite are mentioned also in two females which are found in mountains between Kievka river and Partizanskaja river (near Petrov island). On other hand between the normal specimens from Mt. Krinitshnaya and the national park "Kedrovaja Pad" occurs females with specialized apical segment of cerci (fig. 18), moreover one immature male has right 7-segmented cerci with normal apical segments and left 6-segmented with specialized ones (fig. 19). It is clear that such a specialization of apical segment of cerci is a result of damage in an early stage and have not a taxonomic value. Therefore *G. kurentzovi* must be transferred to genus *Grylloblattina* and regarded as subspecies of *G. djakonovi* until the adult male of the second may be found and good comparison of males genitalia of both may be possible.

All data on *Grylloblattidae* are summarized in my recent paper (STOROZHENKO, 1986 a). After there are papers published: STOROZHENKO (1986 b) with keys of asiatic representatives of family and WANG (1987 a, b) with description of new species from N. E. China, and SZEPTYCKI (1987) with descriptions of two new species from N.E. China and N-Korea. In the present paper keys of genera species and subspecies as well as description of a new genus and one new species of *Grylloblattidae* are given.

Key to the genera

- 1 (4) Posterior margin of pronotum with short middle projection and marginal area (fig. 1, 17).
..... 1. *Grylloblatta*
- 2 (3) Supra-anal plate of male weakly or strongly asymmetrical (figs. 3, 5, 6, 8). Lacinia with one teeth. Pulvilli on the tarsal segment poorly developed. Cerci 8-9-segmented (including weakly separated first and second segments).....

- 3 (2) Supra-anal plate of male symmetrical with strong middle projection on posterior margin (fig. 21). Lacinia with two teeth. Pulvilli well developed. Cerci 9-10-segmented..... 2. *Grylloblattina*
- 4 (1) Posterior margin of pronotum without marginal area.
- 5 (6) Posterior margin of pronotum incurved (fig. 29)..... 3. *Grylloblattella* gen. n.
- 6 (5) Posterior margin of pronotum broadly rounded (figs. 32, 36, 37) or straight (fig. 38)..... 4. *Galloisiana*

KEY TO SPECIES

- 1 (2) Antenna consist of 50 segments; the third segment is 3,5-4,0 times as long as length of the second. Pronotum square (fig. 32). Central Japan: prefectures Nagano, Gifu and Chichibu.....
..... *G. kiyosawai* ASAHINA, 1959
- 2 (1) Antenna consist of not more than 47 segments; the third segment is 1,3 - 3,5 times as long as length of the second segment. Length of pronotum is more than its maximum width (figs. 36-38).
- 3 (4) The third segment of antenna is only 1,3 - 1,5 times as long as length of the second. Eyes well pigmented. Japan: Hokkaido.....
..... *G. yezoensis* ASAHINA, 1961
- 4 (3) The third segment of antenna is 2 - 3,5 times as long as length of the second; if only 1,75 times (*G. notabilis*) then eyes absent.
- 5 (12) Cerci 9-10-segmented. The third segment of antenna is 3-3,5 times as long as length of the second.
- 6 (7) Supra-anal plate of male with asymmetrical tip of median projection (fig. 34). The dorsal valve of ovipositor reaching 3/4 of the fourth cerci segment. S. Korea: province Chung-cheong-buk-do.....
..... *G. kosuensis* NAMKUNG, 1974
- 7 (5) Supra-anal plate of male with symmetrical median projection (figs. 35, 44). The dorsal valve of ovipositor reaching the middle of third segment of cerci.
- 8 (9) Eyes absent. Ratio maximum length of pronotum to its width is 1,05 times (fig. 39). Supra-anal plate of male with the rounded tip of median projection (fig. 44). Posterior margin of 5-6-th tergites of abdomen with 6 setae (fig. 42). U.S.S.R.: Primorje.....
..... *G. ussuriensis* sp. n.

- 9 (8) Eyes well pigmented or absent (aspecially in immature specimens). Ratio length of pronotum to its maximum width is about 1,1 - 1,2 times (fig. 36). Supra-anal plate of male with pointed tip of median projection (fig. 35).
- 10 (11) Posterior margin of 5-6-th tergites with 6 setae. Ratio length of pronotum to its width is 1,1 times. Northern Korea
..... *G. sofiae* SZEPTYCKI, 1987
- 11 (10) Posterior margin of 5-6-th tergites with 8 setae. Ratio length of pronotum to its width is about 1,2 times (fig. 36). Central Japan
..... *G. nipponensis* (CLAUDELL et KING, 1924)
- 12 (5) Cerci 7-8-segmented. Third segment of antenna is only 1,75 - 2,5 times as long as length of the second.
- 13 (14) Eyes well pigmented. Width of pronotum on anterior margin is more than its width on posterior margin (fig. 37). Central Japan: prefectures Nagano, Gumna, Niigata and Chichibu.....
..... *G. yasai* ASAHINA, 1959
- 14 (13) Eyes absent. Pronotum with equal width on anterior and posterior margins (fig. 38).
- 15 (16) The fourth segment of maxillary palpus shorter to length of the third. The third segment of antenna is 1,75 times as long as length of the second. Are known only by immature male. Japan: island Kyushu
..... *G. notabilis* (SILVESTRI, 1927)
- 16 (15) The fourth segment of maxillary palpus subequal to length of the third. The third segment of antenna is 2,2 - 2,3 times as long as length of the second. Japan: prefecture Kagawa.....
(island Magi-shima)..... *G. chujoii* GURNEY, 1961

1. Genus *Grylloblatta* WALKER, 1914

Type species: *Grylloblatta campodeiformis* WALKER, by original designation.

Eyes well pigmented. Lacinia with one teeth. Posterior margin of pronotum with short middle projection and poorly sclerotized marginal area (fig. 1). Supra-anal plate of male weakly or strongly asymmetrical, without strong middle projection on the posterior margin (figs. 2, 3, 5, 6, 8). Cerci 8-9-segmented (including weakly separated first and second segments). Pulvilli on tarsal segment poorly developed. 11 species, one of them divided into 3 subspecies.

Key to species and subspecies

- 1 (16) Antenna consist of 28 - 34 segments.
- 2 (3) Large species, length of pronotum of male 3,3 mm, of female 3,5mm. Supra-anal plate of male weakly asymmetrical (fig. 2). U.S.A.: Washington..... *G. chirurgica* GURNEY, 1961
- 3 (2) Smaller, length of pronotum of male 2,3 - 2,8mm, of female 2,7 - 3,1mm. Supra-anal plate of male strongly asymmetrical.
- 4 (5) Male supra-anal plate with left apical corner conspicuously developed, lobelike (fig. 3). Stylus of right coxopodite of male attached laterally (fig. 4). U.S.A.: S. Oregon.....
..... *G. rothi* GURNEY, 1953
- 5 (4) Male supra-anal plate with left apical corner angular rather than lobelike (figs. 5, 6, 8). Stylus of right coxopodite of male attached basally (figs. 7, 9).
- 6 (9) Posterior margin of male supra-anal plate strongly asymmetrical (figs. 5, 6). U.S.A.: California
- 7 (8) Male supra-anal plate as in fig. 5. Length of pronotum of male 2,8mm, of female 3,1mm. U.S.A.: California (Tuolumne County).....
..... *G. bifratrilecta* GURNEY, 1953
- 8 (7) Male supra-anal plate as in fig. 6. Length of pronotum of male 2,3mm. U.S.A.: California (Eldorado County).....
..... *G. washoe* GURNEY, 1961
- 9 (6) Posterior margin of male supra-anal plate weakly asymmetrical (fig. 8). Canada; U.S.A.: Idaho, Washington
- 10 (11) Antenna of adult composed of 31-32 segments. Stylus of male about four times as long as wide (fig. 7). U.S.A.: N. Washington (Mt. Baker and Hanagen Peak).....
..... *G. occidentalis* SILVESTRI, 1931
- 11 (10) Antenna of adult composed of 28-29 segments. Stylus of male about 2-3 times as long as wide (fig. 9).
- 12 (13) Length of cerci 4,8 - 5,0mm. Basal sclerite portion of right phal-lomere with finger-like projection on the lower margin (fig. 10). Canada: N.E. British Columbia.....
..... *G. campodeiformis nahanni* KAMP, 1979
- 13 (12) Length of cerci 4,4 - 4,5mm. Basal sclerite portion of right phal-lomere without projection on the lower margin (figs. 11, 12).

- 14 (15) Basal sclerite portion of right phallomere with lip-like process on apex of ventral arm (fig. 11). Pronotum of male square, in female 1,1 times as long as broad. Stylus of male only two times as long as wide. Canada: N.W. British Columbia.....
.....*G. campodeiformis athapaska* KAMP, 1979
- 15 (14) Basal sclerite portion of right phallomere without process on apex of ventral arm (fig. 12). Pronotum of male 1,1 times, in female 1,15 - 1,2 times as long as broad. Stylus of male three times as long as wide. Canada: S.E. British Columbia, S.W. Alberta; U.S.A.: N. Idaho, W. Washington.....
.....*G. campodeiformis campodeiformis* WALKER, 1914
- 16 (1) Antenna consist of 36-39 segments.
- 17 (18) The third segment of antenna is only 1,4 - 1,5 times as long as length of the second. U.S.A.: California (Lassen County).....
.....*G. chandleri* KAMP, 1963
- 18 (17) The third segment of antenna is 1,8 - 2,0 times as long as length of the second segment.
- 19 (20) Large species, length of pronotum 3,8 - 4,0mm. U.S.A.: California (Plumas County).....*G. barberi* Caudell, 1924
- 20 (19) Smaller, length of pronotum 2,6 - 3,2mm.
- 21 (22) Dorsal valve of ovipositor reaching distal part of fourth segment of cerci. Stylus in right coxopodite of male tree times as long as wide (fig. 13). Canada: S.W. British Columbia.....
.....*G. scudderi* KAMP, 1979
- 22 (21) Dorsal valve of ovipositor reaching middle of sixth segment of cerci. Stylus of male about four times as long as wide (fig. 14).
- 23 (24) The third segment of antenna is 1,8 times as long as length of the second. Ratio of greatest length of eye to its width is 2,1 times (fig. 15). U.S.A.: Oregon.....
.....*G. sculleni* GURNEY, 1937
- 24 (23) The third segment of antenna is 2,0 times as long as length of the second. Ratio of greatest length of eye to its width 1,4 - 1,7 times (fig. 16). U.S.A.: California (Modoc County).....
.....*G. gurneyi* KAMP, 1963

2. Genus *Grylloblattina* BEY-BIENKO, 1951

Type species: *Grylloblattina djakonovi* BEY-BIENKO, by original designation.

Eyes well pigmented. Lacinia with two teeth. Posterior margin of pronotum

with short middle projection and poorly sclerotized marginal area (fig. 17). Supra-anal plate of male symmetrical, with strong middle projection on posterior margin (fig. 21). Cerci 9-10-segmented, if less then the apical segment specialized (fig. 18). Pulvilli on tarsal segment well developed. One species divated into 2 subspecies for reasons metioned above.

Key to subspecies

- 1 (2) Ratio of greatest length of eye to its width is 1,4 - 1,45 times. External margin of cervical sclerite with three or four setae (macrotrichiae) (fig. 28). Male unknown. U.S.S.R.: S. Primorje (on the east from Partizanskaja river).....
.....*G. djakonovi djakonovi* BEY-BIENKO, 1951 stat. n.
- 2 (1) Ratio of greatest length of eye to its width is 1,7 - 1,8 times. External margin of cervical sclerite with five, sometimes six setae (fig. 27). Right coxopodite of male with strong projection at the base (fig. 20). Genital segments of male as in figs. 22-26. U.S.S.R.: S. Primorje (on the west from Partizanskaja river).....
.....*G. djakonovi kurentzovi* (PRAVDIN et STOROZHENKO, 1977) comb. et stat. n.

3. Genus *Grylloblattella* STOROZHENKO, gen. n.

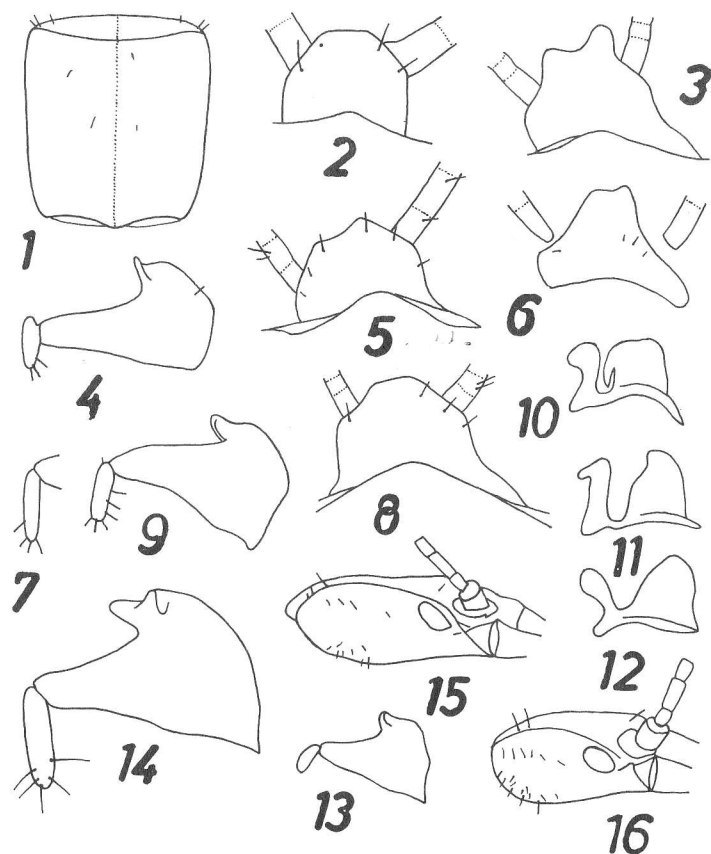
Type species: *Galloisiana pravdini* STOROZHENKO et OLIGER.

Eyes well pigmented or absent. Lacinia with two teeth. Posterior margin of pronotum incurved; without marginal area (fig. 29). Supra-anal plate of male symmetrical; projection on the posterior margin with broadly rounded or truncate tip (figs. 30, 31). Cerci 9-10-segmented. Pulvilli on tarsal segment well developed. Tree species.

Key to species

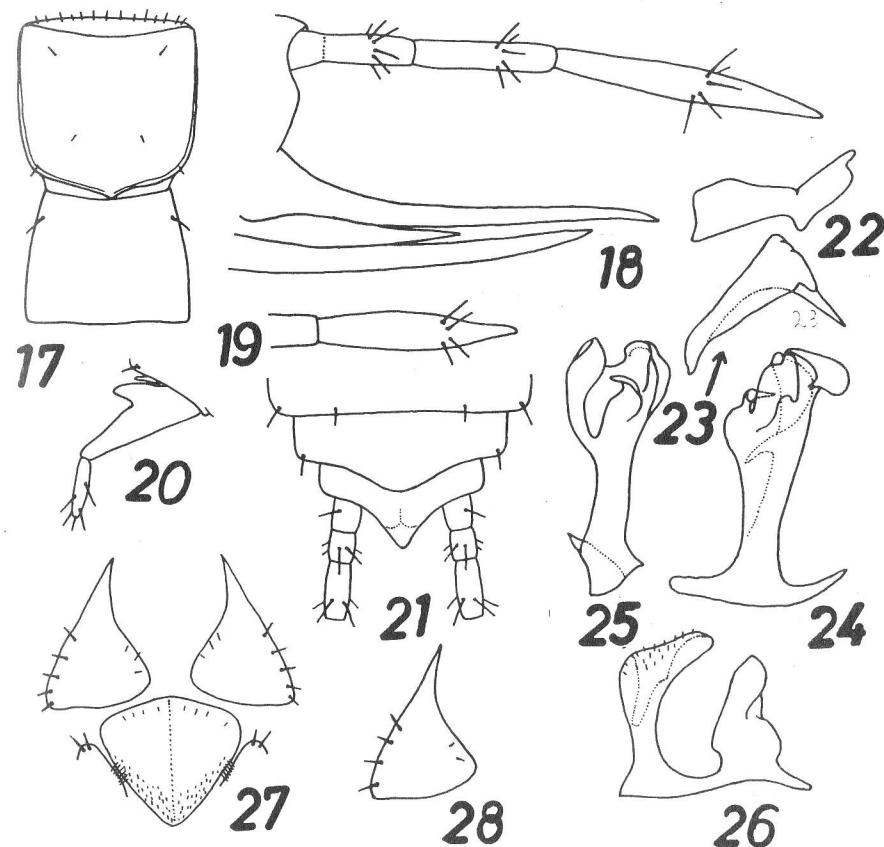
- 1 (2) The third segment of antenna is tree times as long as length of the second segment. Eyes absent. Supra-anal plate of male with truncate tip of median projection (fig. 31). S. Korea: province Kangweon-do
.....*G. biriongensis* (NAMKUNG, 1974), comb. n.

Figs. 1-16. *Grylloblattida* (after KAMP, 1963; 1979 and GURNEY, 1953; 1961):
 1 - pronotum *G. chandleri*; 2 - supra-anal plate of male *G. chirurgica*;
 3 - same *G. rothi*; 4 - right coxopodite *G. rothi*, lateral view; 5 -
 supra-anal plate of male *G. bifratrilecta*; 6 - same *G. washoa*; 7 -
 stylus of right coxopodite *G. occidentalis*, lateral view; 8 - supra-
 anal plate of male *G. campodeiformis campodeiformis*; 9 - right coxo-
 podite *G. campodeiformis campodeiformis*, lateral view; 10 - basal
 sclerite portion of right phallomere *G. campodeiformis nahanni*; 11 -
 same *campodeiformis athapaska*; 12 - same *G. campodeiformis campodei-
 formis*; 13 - right coxopodite *G. scudderi*, lateral view; 14 - same
G. gurneyi; 15 - head *G. sculleni*, lateral view; 16 - same *G. gurneyi*.



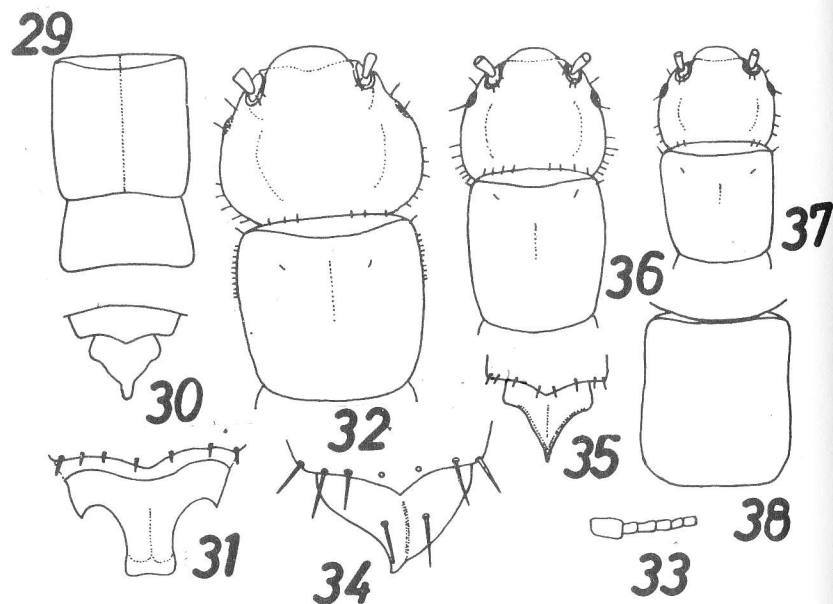
Figs. 17-28. *Grylloblattina* (original).

figs. 17-27 - *G. djakonovi kurentzovi* (from Mt. Krinitshnaya):
 17 - terminal structures of female abdomen; 18 - apical cerci segment
 of immature male; 19 - right coxopodite of male, lateral view; 20 -
 supra-anal plate of male; 21 - terminal structures of male abdomen,
 dorsal view; 22 - first accessory copulatory sclerite; 23 - second
 accessory sclerite; 24 - principal copulatory sclerite, oblique view;
 25 - same, lateral view; 26 - basal sclerite portion of right phallo-
 mere; 27 - cervical sclerites and basisternum; 28 - same *G. djakonovi
 djakonovi*.



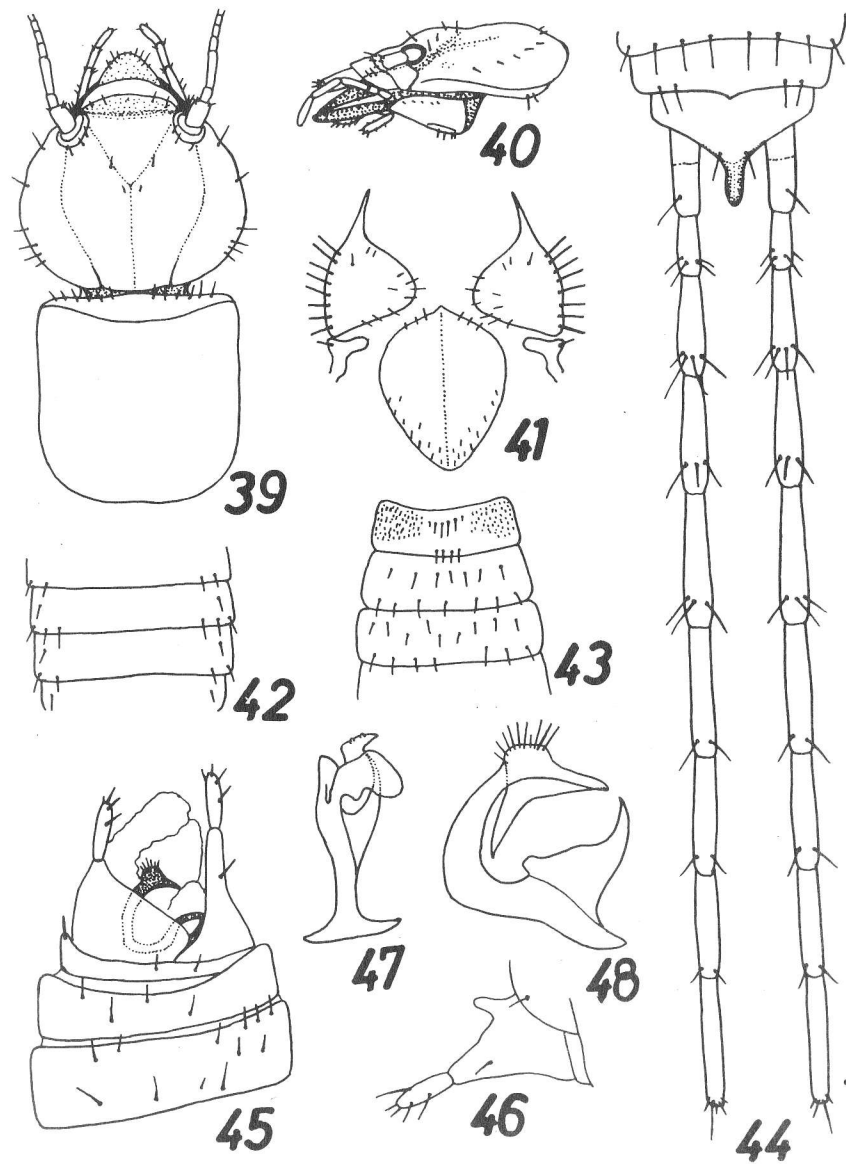
Figs. 29-38. *Grylloblattella* and *Galloisiana* (after ASAHINA, 1959; 1961; GURNEY, 1961; NAMKUNG, 1974; WANG, 1987 and original):

29 - pronotum *Grylloblattella pravdini*; 30 - supra-anal plate of male *Grylloblattella sinensis*; 31 - same *Grylloblattella biryongensis*; 32 - head and pronotum *Galloisiana kiyosawai*; 33 - antenna *Galloisiana yezoensis*; 34 - supra-anal plate of male *Galloisiana kosuensis*; 35 - same *Galloisiana nipponensis*; 36 - head and pronotum *Galloisiana nipponensis*; 37 - same *Galloisiana yasai*; 38 - pronotum *Galloisiana chu-joi*.



Figs. 39-48. Male *Galloisiana ussuriensis*, sp. n.

39 - head and pronotum, dorsal view; 40 - head, lateral view; 41 - cervical sclerite and basisternum; 42 - 5-th and 6-th tergites; 43 - 1-3-th sternites; 44 - terminal structures of abdomen, dorsal view; 45 - same, ventral view; 46 - right coxopodite, lateral view; 47 - principal copulatory sclerite, oblique view; 48 - basal sclerite portion of right phallomere.



- 2 (1) The third segment of antenna is 1,3 - 2,0 times as long as length of the second. Eyes present, well pigmented. Supra-anal plate of male with broadly rounded tip of median projection (fig. 30).
- 3 (4) The third segment of antenna is 2,0 times as long as length of the second. Second-seventh tergites of abdomen with 4 setae (*macrotrichiae*). N.E. China: province Jilin.....
..... *G. sinensis* (WANG, 1987), *comb. n.*
- 4 (3) The third segment of antenna is 1,3 - 1,7 times as long as length of the second. Second-seventh tergites with 6 setae. U.S.S.R.: Altai.....
..... *G. pravdini* (STOROZHENKO et OLIGER, 1984), *comb. n.*

4. Genus *Galloisiana* CAUDELL, 1924

Type species: *Galloisia nipponensis* CAUDELL et KING, by original designation.

Eyes well pigmented or absent. Lacinia with two teeth. Posterior margin of pronotum broadly rounded or stright, without marginal area (figs. 32,36,37, 38). Supra-anal plate of male symmetrical with acute tip of the projection on posterior margin (fig. 35) or tip of projection asymmetrical (fig. 34). Cerci 7-10-segmented. Pulvilli on tarsal segment, well developed. Because of tendency of reduction of eyes are mentioned on same species (for example *G. nipponensis* the subgenus *Ishiana* SILVESTRI, 1927 must be regard as a pure synonym of *Galloisiana*. Nine species.

Key to species

- 1 (2) Antenna consist of 50 segments; the third segment is 3,5 - 4,0 times as long as length of the second. Pronotum square (fig. 32). Central Japan: prefectures Nagano, Gifu and Chichibu.....
..... *G. kiyosawai* ASAHINA, 1959
- 2 (1) Antenna consist of not more then 47 segments; the third segment is 1,3 - 3,5 times as long as length of the second segment. Length of pronotum is more than it maximum width (figs. 36-38).
- 3 (4) The third segment of antenna is only 1,3 - 1,5 times as long as length of the second. Eyes well pigmented. Japan: Hokkaido.....
..... *G. yezoensis* ASAHINA, 1961
- 4 (3) The third segment of antenna is 2 - 3,5 times as long as length of the second; if only 1,75 times (*G. notabilis*) then eyes absent.

- 5 (12) Cerci 9-10-segmented. The third segment of antenna is 3 - 3,5 times as long as length of the second.
- 6 (7) Supra-anal plate of male with asymmetrical tip of median projection (fig. 34). The dorsal valve of ovipositor reaching 3/4 of the fourth cerci segment. S.Korea: province Chung-cheong-buk-do.....
..... *G. kosuensis* NAMKUNG, 1974
- 7 (6) Supra-anal plate of male with symmetrical median projection (figs. 35, 44). The dorsal valve of ovipositor reaching the middle of third segment of cerci.
- 8 (9) Eyes absent. Ratio maximum length of pronotum to its width is 1,05 times (fig. 39). Supra-anal plate of male with rounded tip of the median projection (fig. 44). Posterior margin of 5-6 the tergites of abdomen with 6 setae (fig. 42). U.S.S.R. Primorje: *G. ussuriensis* sp. n.
- 9 (8) Eyes well pigmented or absent (especially in immature specimens). Ratio length of pronotum to its maximum width is about 1,1 - 1,2 times (fig. 36). Supra-anal plate of male with pointed tip of median projection (fig. 35).
- 10 (11) Posterior margin of 5-6-th tergites with 6 setae. Ratio length of pronotum to its width 1,1 times. Northern Korea: *G. sofiae* SZEP-TYCKI, 1987.
- 11 (10) Posterior margin of 5-6th tergites with 8 setae. Ratio length of pronotum to its width is about 1,2 times (fig. 36). Central Japan: *G. nipponensis* (CAUDEL et KING, 1924)
- 11 (12) Eyes well pigmented. Width of pronotum on anterior margin is more than its width on posterior margin (fig. 37). Central Japan: prefectures Nagano, Gumna, Niigata and Chichibu.....
..... *G. yasai* ASAHINA, 1959.
- 12 (5) Eyes absent. Pronotum with equal width on anterior and posterior margins (fig. 38).
- 13 (14) The fourth segment of maxillary palpus shorter to length of the third. The third segment of antenna is 1,75 times as long as length of the second. Are known only by immature male. Japan: island Kyushu..... *G. notabilis* (SILVESTRI, 1927)
- 14 (13) The fourth segment of maxillary palpus cubequal to length of the third. The third segment of antenna is 2,2 - 2,3 times as long as length of the second. Japan: prefecture Kagawa (island Megi-shima)
..... *G. chujoi* GURNEY, 1961

Galloisiana ussuriensis STOROZHENKO, sp. n.

Holotype - male, U.S.S.R.: Primorje, national park "Lazovskij", river Kievka, 26. VII 1987 (A.A. LAPTEV); in Zoological Institute of USSR Academy of Sciences, Leningrad.

Body medium-size for genus; pronotum, mesonotum, metanotum and tergites covered with numerous short hairs. Head broader than pronotum; with setae; without eyes (figs. 39, 40). The third segment of maxillary palpus longer than fourth. The third segment of antenna is about three times longer than the second, right and left antennae with 15-17 segments (both broken). Pronotum slightly longer than its width with broadly rounded posterior margin (fig. 39). The cervical sclerite with eight setae (macrotrichiae) on external margin; basisternum oviform (fig. 41). Legs long; femur ratios (length divided by width) as follows; profemur 4,4 times, metafemur 4,9 times. Pro-tibia and mesotibia as long as length of femur, metatibia longer than meta-femur. Posterior margin 4-th, 5-th, 7-th and 9-th tergites with 4 setae (macrotrichiae), 6-th tergite with 6 setae, 8-th tergite with 8 setae (figs. 42, 44). First sternite with two rows of macrotrichiae and two lateral areas covered with numerous short hairs; other sternites with numerous setae which are arranged rather irregularly (figs. 43, 45). Supra-anal plate with long median projection on posterior margin and with two setae; cerci 10-segmented (fig. 44). Coxopodites assymetrical; the left wider than the right (fig. 45); right coxopodite with a process on the base; stylus three times longer than its width; with long setae (fig. 46). First and second accessory sclerite well sclerotized. Principal copulatory sclerite and basal sclerite portion of right phallomere as in figs. 47, 48.

General coloration brown; head and pronotum noticeably darker; antennae and legs light-brown.

Measurements (in mm): length body 20,7; head 4,8; pronotum 4,0; profemur 3,8; metafemur 4,8; width head 4,1; pronotum 3,9.

Female unknown.

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